Medical Science Journal for Advance Research

Vol. 3 , No. 3 , September 2022
e-ISSN: 2774-4892

Normal Liver Size In Adults Without Suspicion Of Liver Disease Analyzing The Variable (Age, Weight, & Height) That Has Good Correlation

Ali Rashid[1], Abid Ali[2] And Taiba zulfiqar[3].
1-3University Institute of Radiological Sciences and Medical Imaging Technology,The University of Lahore, Gujrat Campus, Pakistan.

*** Corresponding Author e-mail: 70058503@student.uol.edu.pk**

ABSTRACT

Aim/Objective:*To determine the normal liver size in adults without suspicion of liver disease analyzing the variable (age, weight, & height) that has good correlation.*

Methods: *The study was undertaken in Department of Radiology in Services Hospital (SHL)/ Services Institute of Medical Sciences (SIMS) Lahore. It was hospital based study and normal healthy adult without liver disease in the age range from 18 years to 78 years were selected for this study. 207 healthy adults without liver disease & without specification of gender were selected. Non- randomized or consecutive sampling technique was used due to limited time of 3 months from 1st December 2016 to 1st March 2016.*

Results: *The mean age of total subjects was 34.85±14.67 years. The mean age of male was 35.6± 14.47 years and 33.8±14.95 years for female. There were 83 (40%) subjects in the age range of 18-27 years, 51 (24.6%) subjects in the age range of 28-37 years, 29 (14.1%) subjects in the age range of 38-47 years, 24 (11.6%) subjects in the age range of 48-57 years, 13 (6.3%) subjects in the age range of 58-67 years, 7 (3.4%) subjects in the age range of 68-77 years.The mean longitudinal diameter of liver of total subjects was 14.34±0.79cm (p=0.001). The mean longitudinal diameter of liver was 14.50±0.71cm & 14.1±0.84cm in male and female respectively.*

The mean height of total subjects was 163.56±6.7cm. The mean height was 165.74±6.0cm for male & 160.72±6.6 for female respectively.

The distribution of liver sizes in the various age groups is shown in table 3. The result demonstrates that liver sizes increases with age. The results also show that males had larger liver size than females. The size of the liver was correlated with age, weight, and height showed positive and significant correlation with liver size.

Conclusion:*Ultrasound has been found to be both accurate and wide spread in clinical use and has no proven health hazard. The sonographic measurement of liver at the midclavicular line was shown to be an easy and practical method for routine use. Sex and body height are the most important factors associated with the diameter of the liver measured at the midclavicular line.*

Keywords: Liver,normal size,age.

Article Information
Received: July 19, 2022; Revised: Auguest 14, 2022; Online: September 4, 2022

INTRODUCTION

Clinical measurements of adult liver size involve palpating the liver's lower border or percussion of the liver's upper and lower edges. These clinical methods are less accurate since there is a possibility that pleural effusions will cause an overestimation of liver size, subdiaphragmatic diseases will cause an underestimating, and a tympanic note over the right upper abdomen will cause an overestimation. Clinically, a slight increase in liver size can sometimes go unnoticed. The clinician may require the aid of a radiological diagnostic study, such as ultrasonography, for a detailed examination. Ultrasonography is a

https://doi.org/10.46966/msjar.v3i3.53

Published by: READ INSTITUTE

real-time, quick, noninvasive, affordable, practical, and effective way to measure the size of the liver.[1] The physician can do portable bedside ultrasonography, which is currently fascinating more and more since portable ultrasound is smaller in size and is simple to use. Though computed tomography is the most accurate over ultrasonography for the evaluation of liver size, there are certain positives of sonography such repetitive use as much as needed and it fully lacks radiation. Evaluation of the liver's size aids in the identification of underlying liver disease, It aids in the management and treatment of disorders and slows their progression. For procedures like liver transplants, monitoring post-operative complications, and determining the effectiveness of treatment, accurate liver measurement is crucial. The precise length of the liver to interpret as hepatomegaly on a sonogram differs from radiologist to radiologist. Hepatomegaly can have a variety of causes, including infectious diseases, cancerous conditions, and anthropometric variances in a population with diverse ethnic and geographic origins.[2]

MATERIAL AND METHODS

The study was undertaken in Department of Radiology in Services Hospital (SHL)/ Services Institute of Medical Sciences (SIMS) Lahore. It was hospital based study and normal healthy adult without liver disease in the age range from 18 years to 78 years were selected for this study. 207 healthy adults without liver disease & without specification of gender were selected. Non- randomized or consecutive sampling technique was used due to limited time of 3 months from 1st December 2011 to 1st March 2012.

A questionnaire containing closed- ended questions was developed and all of 207 questionnaires were filled during data collection. The Individual was already informed about examination. Ultrasonographic machine (TOSHIBA Model SSA-320A) was used for this purpose and examination was performed with High resolution frequency transducer (3.5 MHz). Subject was positioned supine and special gel was applied from the epigastrium to lower costal margin. The radiologist was performed the ultrasound of liver and took measurements of longitudinal diameter of liver. All these measurements were noted in questionnaire along with other required information mentioned as name, age, weight, and height.

RESULTS

In the distribution of subjects by sex 117 were male and 90 were females. There were 56.5% Male and 43.5% female.

The mean age of total subjects was 34.85±14.67 years. The mean age of male was 35.6± 14.47 years and 33.8±14.95 years for female. There were 83 (40%) subjects in the age range of 18-27 years, 51 (24.6%) subjects in the age range of 28-37 years, 29 (14.1%) subjects in the age range of 38-47 years, 24 (11.6%) subjects in the age range of 48-57 years, 13 (6.3%) subjects in the age range of 58-67 years, 7 (3.4%) subjects in the age range of 68-77 years.

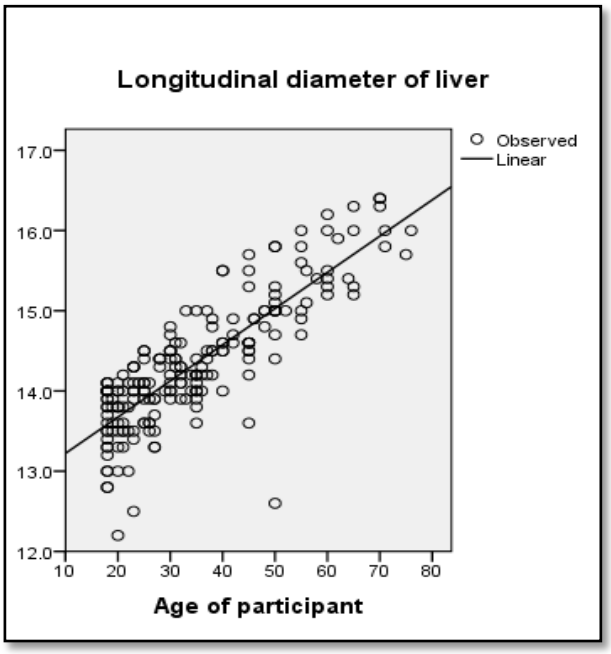
The mean longitudinal diameter of liver of total subjects was 14.34±0.79cm (p=0.001). The mean longitudinal diameter of liver was 14.50±0.71cm & 14.1±0.84cm in male and female respectively.The mean height of total subjects was 163.56±6.7cm. The mean height was 165.74±6.0cm for male & 160.72±6.6 for female respectively. The distribution of liver sizes in the various age groups is shown in table 3. The result demonstrates that liver sizes increases with age. The results also show that males had larger liver size than females. The size of the liver was correlated with age, weight, and height showed positive and significant correlation with liver size.

Table:1 Estimated value of Liver size (n=207)

Sex	N	mean±SD		P-value
Male	117	14.50±0.715cm		0.001
Female	90	14.13±0.8465cm		
Over all estimated value of Liver size is 14.34±0.79cm. The longitudinal diameter of liver is significantly higher in males then females.				

Correlation between Liver Size and Age:

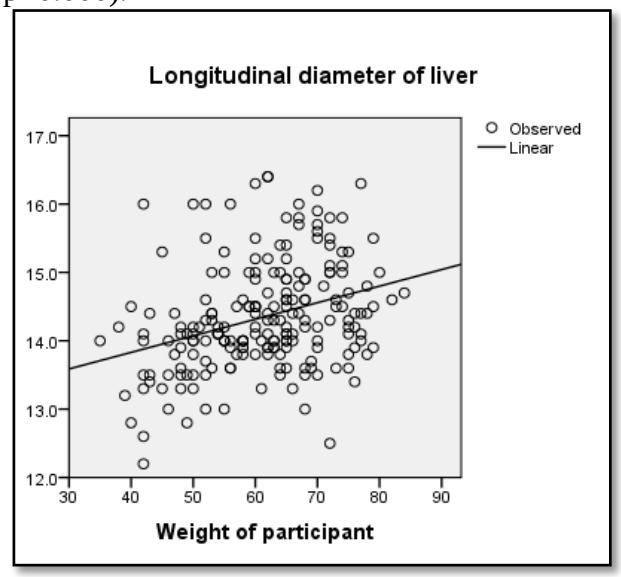
There is a significant and positive correlation between Liver size and age (r=0.83, p=0.000).



"Scatter diagram no. 1"

Correlation between Liver Size and weight:

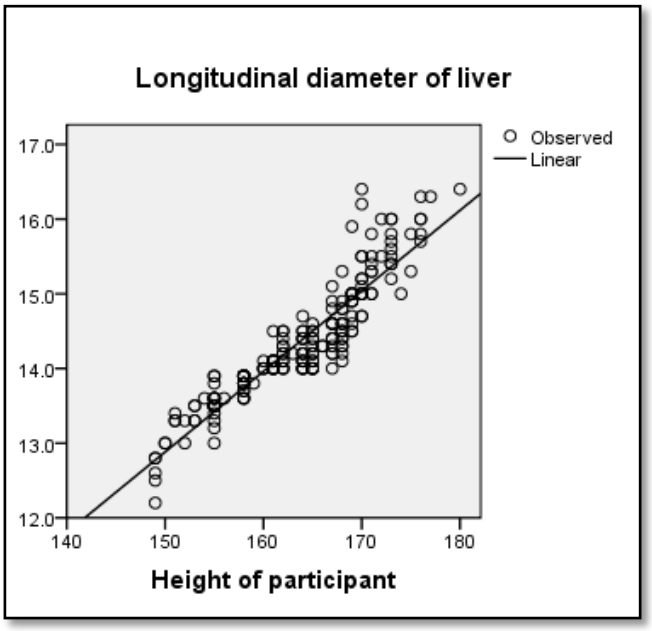
There is a significant and weak correlation between Liver size and weight (r=0.32, p=0.000).



"Scatter diagram no. 2"

Correlation between Liver Size and height:

There is a significant and positive correlation between Liver size and height (r=0.92, p=0.000).



"Scatter diagram no. 3"

DISCUSSION

Diagnostic imaging techniques are superior to clinical examination in determining the size of the liver. [3,4] · Sonography is one of the most common imaging methods which are used in routine practice.[5] Ultrasound (US) is an extremely important imaging method in the evaluation of the liver due to the fact that it is easy to use, provides real-time images, does not require anaesthesia and does not utilise ionising radiation. In most cases, determination of hepatomegaly is necessary and generally sonography is performed for this purpose. In cases of gross enlargement of the liver, confirmation of hepatomegaly is easy. In adults, decrease or increase in the size of the liver is an important index of some disease processes going on in the liver or other systemic pathologies. Hepatic distention and smooth enlargement are typical of significant right sided heart failure, which occurs because of hepatic venous congestion secondary to impaired myocardial function. [6]

Longitudinal hepatic diameter at MCL is the most commonly applied and predominant clinical method of estimating liver size in routine diagnostic situations. 9- 11 As well, it proved to be the best measured diameter in differentiating between healthy and diseased livers, had a better correlation with autopsy studies and BSA measurement, and was proved to be an easy practical method for routine use in this purpose.[7, 8] Therefore, we chose to use only longitudinal hepatic diameter at MCL for liver size measurement in our study. Kratzer et al. (Wolfgang Kratzer, 2003) conducted a similar prospective study on a larger population to establish normal value for liver diameter at MCL and to determine the influence of sex, height, and BMI and alcohol consumption on liver size. In their sample, the average measured liver diameter at MCL was 14.0 cm.There are many studies done on the liver size but there is no reliable and valid references value of the liver due to variation in men to women and in different ethnic groups. So first of all normal values of liver size must be established.The mean total AP diameter of the liver in our study population is 14.34±0.79cm.This is similar to the findings of earlier studies.[6]

Our findings in our population is at variance with other previous study. (Mittal R, 2010) Males had larger liver size than females (14.50 versus 14.10, P= 0.001). This agrees with the phenomenon that males` gastrointestinal organs are larger than female organs .This had been documented in earlier studies. [9,10] The sizes of the liver were correlated with physical data such as age, sex, weight, and height. Our findings show that age affects the size of the liver only in the active age groups. In the older age groups, the size of the liver reduced significantly. Earlier studies reported that liver sizes decreases with age [11,12.] Sex had a strong and significant (P = 0.001) correlation with longitudinal diameter of the liver. Males had lager liver dimensions than females. The correlation of longitudinal diameters of the liver with weight is weak in our study. Height had significant and positive correlation with liver diameter (p<0.001).

CONCLUSION

Ultrasound has been found to be both accurate and wide spread in clinical use and has no proven health hazard. The sonographic measurement of liver at the midclavicular line was shown to be an easy and practical method for routine use. Sex and body height are the most important factors associated with the diameter of the liver measured at the midclavicular line.

REFERENCES

1. Kratzer W, Fritz V, Mason RA, Haenle MM, Kaechele V, Roemerstein Study Group. Factors affecting liver size: a sonographic survey of 2080 subjects. Journal of ultrasound in medicine. 2003 Nov;22(11):1155-61.
2. Fritschy P, Robotti G, Schneekloth G, Vock P. Measurement of liver volume by ultrasound and computed tomography. Journal of Clinical Ultrasound. 1983 Aug;11(6):299-303.
3. Sapira JD, Williamson DL. How big is the normal liver?. Archives of internal medicine. 1979 Sep 1;139(9):971-3.
4. Zoli M, Magalotti D, Grimaldi M, Gueli C, Marchesini G, Pisi E. Physical examination of the liver: is it still worth it?. American Journal of Gastroenterology. 1995 Sep 1;90(9):1428-32.
5. Safak AA, Simsek E, Bahcebasi T. Sonographic assessment of the normal limits and percentile curves of liver, spleen, and kidney dimensions in healthy school- aged children. Journal of ultrasound in medicine. 2005 Oct;24(10):1359-64.

6. Kratzer W, Fritz V, Mason RA, Haenle MM, Kaechele V, Roemerstein Study Group. Factors affecting liver size: a sonographic survey of 2080 subjects. Journal of ultrasound in medicine. 2003 Nov;22(11):1155-61.
7. Caselitz M, Bahr MJ, Bleck JS, Chavan A, Manns MP, Wagner S, Gebel M. Sonographic criteria for the diagnosis of hepatic involvement in hereditary hemorrhagic telangiectasia (HHT). Hepatology. 2003 May 1;37(5):1139-46.
8. Dittrich M, Milde S, Dinkel E, Baumann W, Weitzel D. Sonographic biometry of liver and spleen size in childhood. Pediatric radiology. 1983 Jul;13(4):206-11.
9. Gladisch R, Elfner R, Schlauch D, Filser T, Heene DL. A simple technique for sonographic estimation of liver volume. Zeitschrift fur Gastroenterologie. 1988 Nov 1;26(11):694-8.
10. Andersen V, Sonne J, Sletting S, Prip A. The volume of the liver in patients correlates to body weight and alcohol consumption. Alcohol and Alcoholism. 2000 Sep 1;35(5):531-2.
11. Fritsch WP. Sonographic measurements of the normal liver, spleen, pancreas, and portal vein. Radiology. 1983;149:537-40.
12. de la Grandmaison GL, Clairand I, Durigon M. Organ weight in 684 adult autopsies: new tables for a Caucasoid population. Forensic science international. 2001 Jun 15;119(2):149-54.